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Study Group 15
Experts Group for Video Coding and Systems
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Title: Video Conferencing Control and Indication Signals for H.262
Purpose: Discussion/Proposal

1. Introduction

Several video conferencing Control and Indication (C&I) signals, which are defined in Recommendations H.320 and H.230, require synchronization with the transmitted video pictures [1] [2]. In order to achieve this synchronization, the relevant C&I signals (shown in Table 1) are embedded in the H.261 picture header using the Picture TYPE (PTYPE) field (6 bits).

Table 1: H.261 Control and Indication Signals

Signal	Values	PTYPE Bit	Source	Sink
Split screen indicator	**"0" off "1" on**	**1**	**Sending Terminal**	**Receiving Terminal**
Document camera indicator	**"0" off "1" on**	**2**	**Sending Terminal**	**Receiving Terminal**
Freeze picture release indicator	**"0" off "1" on**	**3**	**Encoder**	**Decoder**
Source format	**"0" QCIF "1" CIF**	**4**	**Encoder**	**Decoder**
Still image mode	**"0" on "1" off**	**5**	**Encoder**	**Decoder**

Although there is a general agreement and understanding that H.32X terminals will support C&I signals [3] similar to the ones defined in H.230, there is not a clear indication (yet) on how these signals will be transmitted. In this contribution we propose that the AVC Experts Group pay a special attention to the C&I signals which are tightly coupled with the video pictures (i.e., the ones shown in Table 1). The main reason for advocating such an attention is that the transmission of these signals *may* require their inclusion in the H.262 picture header as explained below. Different alternatives are discussed in the next section for the transmission of these signals.

Therefore, it is assumed in here that (i) the signals shown in the above table (or very similar ones) will be required by H.32X terminal users for video conferencing applications, and (ii) these signals have to be synchronized with particular pictures in the video sequence. These two assumptions are the basis for the alternatives outlined in the below[1]. In the remaining of this contribution, we refer to the C&I messages that require synchronization with the video pictures as the *video* C&I signals.

2. Video C&I Signals' Transmission Options

Currently, there is no (explicit) provision within H.262 (MPEG-2 video [4]) for the transmission of the C&I signals shown in Table 1[2]. In order to synchronize these signals with the video pictures, the following alternatives may be considered:

1. The video C&I signals are transmitted through a separate (logical) channel[3]. Under this option, the C&I signal should be tagged with the same H.262 *temporal_reference* value of the picture impacted by the signal. The main issue in here however is that the decoder (or the receiving terminal) should receive the desired C&I signal in-time when the picture under consideration is ready for processing (decoding and/or display). This may be hard to achieve if the video signal and C&I messages use different ATM virtual channels with different Quality of Service (QoS) attributes.
2. Transmit the signal in the *user_data* or *extension_data* fields within the H.262 video sequence header. In this case, the C&I signal will impact the first picture following the sequence header. This option, however, requires the transmission of the sequence header every time a video C&I signal is transmitted[4].
3. Transmit the signal in the *PES_extension* field within the PES packet header. In this case, the C&I signal will impact the first picture following the PES header. Similar to the previous option, this scenario requires the transmission of the PES header every time a video C&I signal is transmitted. In addition, currently, the *PES_extension* field is a reserved field by the MPEG-2 system specification.
4. The C&I signal can be transmitted in the *extra_information_picture* field of the H.262 picture header. This might be the best solution from picture-synchronization, timing, and implementation point of view. However, currently the H.262 (MPEG-2 video) Draft International Standard (DIS) document specify that this field is: "Reserved. A decoder conforming to this specification that encounters extra_information_picture in a bit stream shall ignore it (parse from bitstream and discard)."

Other solutions which are similar to the above options can also be considered.

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1. It is important to note that other C&I signals (e.g., maintenance, multipoint control unit, etc.) can be transmitted by a separate channel as done in H.320 terminals using the Bit Allocation Signal (BAS) command messages. The definition of these other C&I signals and their transmission is beyond the scope of this contribution.

2. An exception to this is the picture format signal which can be defined using the *vertical_size_value* and *horizontal_size_value* fields in the H.262 video sequence header.

3. This might be the same channel used to transmit the *other* C&I signals mentioned in footnote1.

4. The transmission of a new sequence header will require, among other things, the transmission of the *sequence_extension* fields.

3. Conclusion

It is proposed that the AVC Experts Group consider the different options outlined in the previous section for the transmission of video C&I signals that require synchronization with particular video pictures within the sequence. Based on the above observations, each option has its own advantages and disadvantages. It seams that the option in item 4 above could represent a good alternative since it provides (i) an efficient approach for transmitting the desired C&I signals (i.e., no re-transmission of unnecessary header information), and (ii) the needed (tight) synchronization with the video pictures in a simple manner (similar to the H.261 mechanism). However, this option requires some changes in the existing text of the H.262 specification. Therefore, other options should also be considered by the Experts Group.

References

[1] CCITT Draft revised Recommendation H.320, "Narrow-band visual telephone systems and terminal equipment," Study Group XV, Geneva, May 4-15,1992

[2] CCITT Draft revised Recommendation H.230, "Frame-synchronous control and indication signals for audiovisual services," Study Group XV, Geneva, May 4-15,1992

[3] ITU-T Draft Recommendation H.32X, "Broad-band audiovisual communication systems and terminal equipment," March, 1994.

[4] Recommendation H.262, ISO/IEC 13818-2 DIS, "Generic coding of moving picture and associated audio," March, 1994, Paris